

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated August 22, 2007. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

As outlined above, claims 1, 5, 7-10, 14, 16, and 18-26 stand for consideration in this application, wherein claim 13 is being canceled while 1, 5, 19-20, and 23 claims are being amended.

All amendments to the application are fully supported therein. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Formal Rejections

Claims 1, 5, 7-10, 13-14, 16, 18, 19, and 23-26 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

Claims 1, 5, 7-10, 13-14, 16, 18, 19, and 23-26 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Claims 1, 5, 19, and 23 are being amended so as to meet the requirements under 35 U.S.C. §112, first paragraph and 35 U.S.C. §112, second paragraph. Accordingly, withdrawal of these formal rejections is respectfully requested.

Prior Art Rejections

The First 35 U.S.C. §103(a) Rejection

Each of claims 1, 5, 7, 8, 13, 14, 16, 18-20 and 23-26 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Mullee (U.S. Pat. 6,306,564) in view of Vaartstra (U.S. Pat. 6,242,165) and Skee et al. (U.S. Pat. 5,989,353). As set forth above, claim 13 is being canceled and the elements recited in claim 13 are being incorporated into claims 1, 5, 19, 20, and 23. The rejection of claims 1, 5, 7, 8, 14, 16, 18-20, and 23-26 is respectfully traversed for the reasons set forth below.

Claim 1

Claim 1 as amended recites that a composition for removing residues from the microstructure of an object comprises: carbon dioxide; an additive for removing the residues comprising a fluoride having a formula $\text{NR}_1\text{R}_2\text{R}_3\text{R}_4\text{F}$, where each of R_1 , R_2 , R_3 , and R_4 is an alkyl group, and a basic compound including a quaternary ammonium hydroxide; and a co-solvent for dissolving said additive in said CO_2 at a pressurized fluid condition, wherein at least said carbon dioxide is in a supercritical state so as to maintain the composition comprising said carbon dioxide, said additive and said co-solvent as a single composition, wherein weight percents of said carbon dioxide, said additive and said co-solvent are such that the composition comprising said carbon dioxide, said additive and said co-solvent effectively penetrates residues on the microstructure, and wherein the fluoride is selected from tetramethylammoniumfluoride, tetraethylammonium-fluoride, tetrabutylammoniumfluoride, tetrapropylammoniumfluoride, choline fluoride, and mixtures thereof.

The Examiner asserted that Vaastra teaches equivalence of tetramethyl ammonium fluoride to ammonium fluoride in a similar cleaning composition and Mullee teaches the use of ammonium fluoride. The Examiner further asserted that it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use tetramethylammonium hydroxide in the composition taught by Mullee, on the grounds that Skee teaches the equivalence of quaternary ammonium hydroxide to various amines as an alkaline compound in a similar cleaning composition and Mullee teaches the use of alkaline compounds including various amines. Applicants respectfully disagree.

As set forth in the declaration hereby submitted under 37 C.F.R. §1.132, ammonium fluoride is not equivalent to tetramethyl ammonium fluoride in the cleaning composition in a supercritical state. In the supercritical composition, a salt portion of the composition precipitates out and it will not be present to buffer the composition. Once ammonium fluoride loses equilibrium, ammonium fluoride gives off ammonia (NH_3) gas leaving a fluoride ion present thereby forming HF that would make the composition more acidic in nature. A more acidic pH cleaning composition effects the cleaning performance and starts to etch any dielectric or other layers present within the substrate. Thus, ammonium fluoride is not equivalent to tetramethyl ammonium fluoride in the cleaning composition in a supercritical state.

Therefore, one of ordinary skill in the art would not and could not achieve all the features as recited in claim 1. Accordingly, claim 1 is not obvious in view of all the prior art cited.

Claims 5, 19, 20, 23

Claims 5, 19, 20, and 23 have substantially the same features as those of claim 1, at least with respect to a composition comprising a carbon dioxide, an additive comprising an additive for removing the residues comprising a fluoride having a formula $NR_1R_2R_3R_4F$, where each of R_1 , R_2 , R_3 , and R_4 is an alkyl group, and a quaternary ammonium hydroxide; and a co-solvent for dissolving said additive in said CO_2 at a pressurized fluid condition, wherein at least said carbon dioxide is in a supercritical state so as to maintain the composition comprising said carbon dioxide, said additive and said co-solvent as a single composition and wherein weight percents of said carbon dioxide, said additive and said co-solvent are such that the composition comprising said carbon dioxide, said additive and said co-solvent effectively penetrates residues on the microstructure, and wherein the fluoride is selected from tetramethylammoniumfluoride, tetraethylammonium-fluoride, tetrabutylammoniumfluoride, tetrapropylammoniumfluoride, choline fluoride, and mixtures thereof. As such, the arguments set forth above are equally applicable here. Claim 1 being allowable, claims 5, 19, 20, and 23 must also be allowable.

Claims 7, 8, 14, 16, 18, 24-26

As to dependent claims 7, 8, 14, 16, 18, and 24-26 the arguments set forth above with respect to independent claims 1, 5, and 19 are equally applicable here. The corresponding base claim being allowable, claims 7, 8, 14, 16, 18, and 24-26 must also be allowable.

The Second 35 U.S.C. §103(a) Rejection

Each of claims 1, 5, 7-10, 16, 18-20, and 23-26 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over WO 01/33613 (WO '613) in view of Vaartstra and Skee. These rejections are respectfully traversed for the reasons set forth below.

Claim 1

As admitted by the Examiner, WO '613 does not teach an alkyl ammonium fluoride, a quaternary ammonium hydroxide, or a cleaning composition containing carbon dioxide, an

alkyl ammonium fluoride compound, a quaternary ammonium hydroxide, a cosolvent, and the other requisite components in the specific proportions as recited in claim 1. Furthermore, WO '613 does not show or suggest comprising fluoride which is selected from tetramethylammoniumfluoride, tetraethylammonium-fluoride, tetrabutyl-ammoniumfluoride, tetrapropylammoniumfluoride, choline fluoride, and mixtures thereof.

Regarding Vaartstra and Skee, the arguments set forth above are equally applicable here. In other words, the secondary references of Vaartstra and Skee fail to provide any disclosure, teaching or suggestion that make up for the deficiencies in WO '613. Therefore, at the time the invention was made, one of ordinary skill in the art would and could not achieve all the features as recited in claim 1. Accordingly, claim 1 is not obvious in view of all the prior art cited.

Claims 5, 19, 20, 23

Claims 5, 19, 20 and 23 have the substantially same features as those of claim 1, as set forth above. As such, the arguments set forth above are equally applicable here. Claim 1 being allowable, claims 5, 19, 20 and 23 must also be allowable.

Claims 7-10, 16, 18, 24-26

As to dependent claims 7-10, 16, 18, and 24-26 the arguments set forth above with respect to independent claims 1, 5, and 19 are equally applicable here. The corresponding base claim being allowable, claims 7-10, 16, 18, and 24-26 must also be allowable.

The Third 35 U.S.C. §103(a) Rejection

Each of claims 1, 5, 7-10, 13, 14, 16, 18-20, and 23-26 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Xu et al. (U.S. 2003/0125225) in view of Skee. As set forth above, claim 13 is being canceled. The rejections against each of claims 1, 5, 7-10, 14, 16, 18-20, and 23-26 are respectfully traversed for the reasons set forth below.

Claim 1

Xu merely shows that an additive for removing the residues comprises ammonium fluoride. Xu does not show or suggest that an additive for removing the residues comprises a fluoride having a formula $NR_1R_2R_3R_4F$, where each of R_1 , R_2 , R_3 , and R_4 is an alkyl group and the fluoride is selected from tetramethylammoniumfluoride, tetraethylammonium-

fluoride, tetrabutyl-ammoniumfluoride, tetrapropylammoniumfluoride, choline fluoride, and mixtures thereof. As set forth above, the secondary reference of Skee shows that a composition to remove metal contamination on the surface of a wafer comprises alkaline solution such as tetramethyalkyl ammonium hydroxide, tetraethyl ammonium hydroxide, methyl-1, 5-pentanediamine, and monoethanolamine. However, Skee does not show that the composition comprises a fluoride having a formula $NR_1R_2R_3R_4F$, where each of R_1 , R_2 , R_3 , and R_4 is an alkyl group. In other words, the secondary reference of Skee fails to provide any disclosure, teaching or suggestion that make up for the deficiencies in Xu. Therefore, at the time the invention was made, one of ordinary skill in the art would and could not achieve all the features as recited in claim 1. Accordingly, claim 1 is not obvious in view of all the prior art cited.

Claims 5, 19, 20, 23

Claims 5, 19, 20, and 23 have substantially the same features as those of claim 1, as set forth above. As such, the arguments set forth above are equally applicable here. Claim 1 being allowable, claims 5, 19, 20, and 23 must also be allowable.

Claims 7-10, 14, 16, 18, 24-26

As to dependent claims 7-10, 14, 16, 18, and 24-26 the arguments set forth above with respect to independent claims 1, 5 and 19 are equally applicable here. The corresponding base claim being allowable, claims 7-10, 14, 16, 18, and 24-26 must also be allowable.

The Fourth 35 U.S.C. §103(a) Rejection

Each of claims 21 and 22 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Mullee in view of Vaartstra and Skee, WO '613 in view of Vaartstra and Skee, or Xu in view of Skee, and further in view of McCullough. These rejections are respectfully traversed for the reasons set forth below.

The secondary reference of McCullough fails to provide any disclosure, teaching or suggestion that make up for the deficiencies in Mullee, Vaartstra, Skee, WO '613, Xu and the knowledge generally available to one of ordinary skill in the art at the time the invention was made. Accordingly, claims 21 and 22 must be allowable.

The Fifth 35 U.S.C. §103(a) Rejections

Claim 9 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Mullee in view of Vaartstra and further in view of McCullough or WO '613. This rejection is respectfully traversed for the reasons set forth below.

The secondary reference of McCullough fails to provide any disclosure, teaching or suggestion that make up for the deficiencies in Vaartstra and the knowledge generally available to one of ordinary skill in the art at the time the invention was made. Accordingly, claim 9 must be allowable. Accordingly, claim 9 must be allowable.

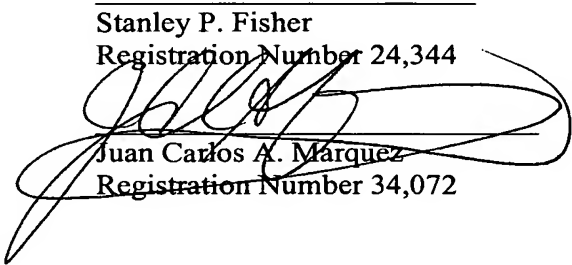
Conclusion

In light of the Amendments and Remarks, Applicants respectfully request early and favorable action with regard to the present application, and a Notice of Allowance for all pending claims is earnestly solicited.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

Respectfully submitted,

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January 17, 2008
SPF/JCM/YOM